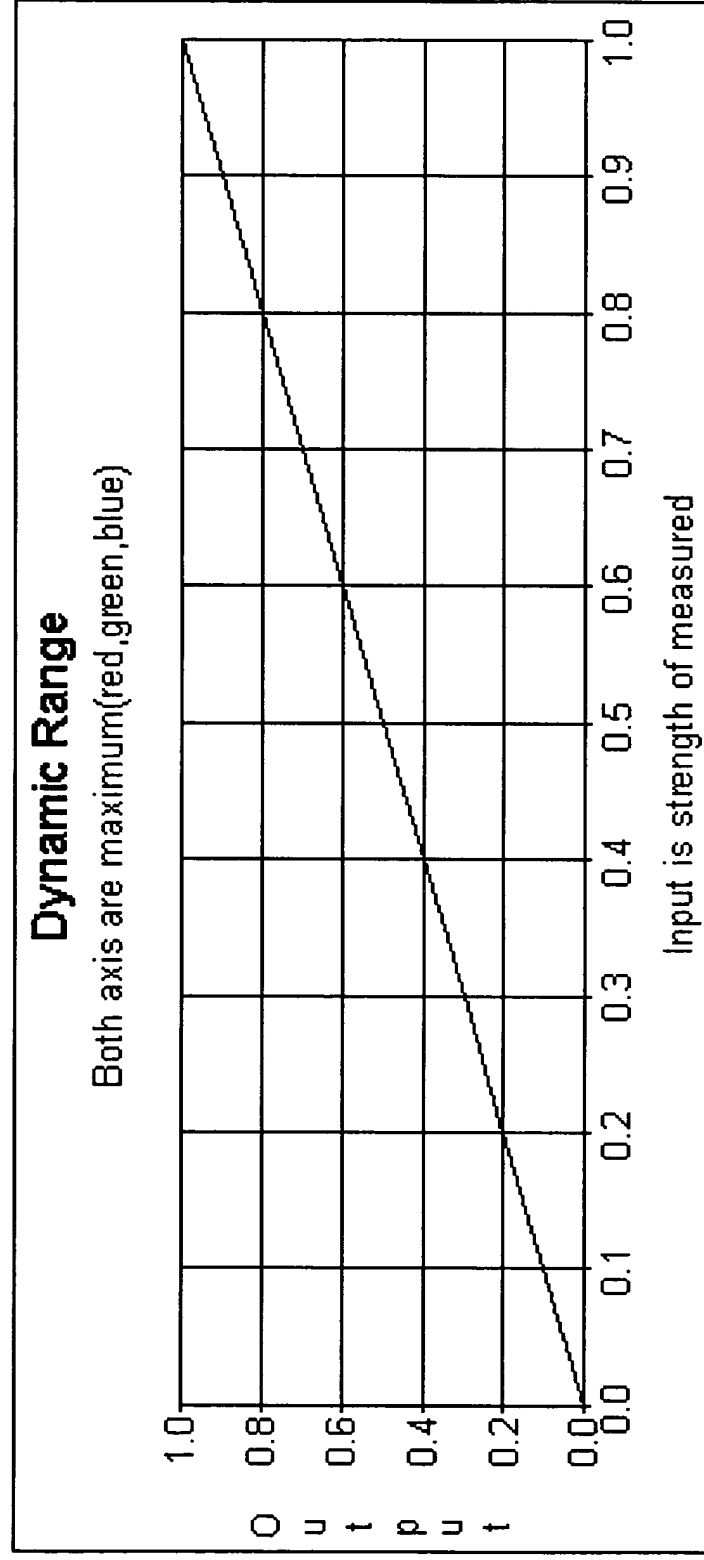


Fig. 1



2/22

pbox.Picture = LoadPicture(file_in)

a rectangular picture of columns and rows is displayed

For icol = 1 To pbox.ScaleWidth

loops through the columns of the image,

For irow = 1 to pbox.ScaleHeight

loops through the rows of the image

color = pbox.Point(icol,irow)

the color of the point at current column, row.

blue = color / 65536

This sets blue to the most significant byte (division by $256 * 256$)

color = color mod 65536

This keeps only the 2 least significant bytes (mod of $256 * 256$)

green = color / 256

This sets green to the (next) most significant byte (division by 256)

red = color mod 256

This sets red to the least significant byte (modulus of 256)

strength = red

If strength < green Then strength = green

If strength < blue Then strength = blue

the dot maximum is found

corr = corra(strength)

Lookup correction for that value of dot maximum then correct RGB in the dot

red = red * corr

green = green * corr

blue = blue * corr

Red, green, blue are now corrected to desired values

pbox.PSet(icol,irow),RGB(red,green,blue)

Put the adjusted and corrected dot back into the image on the screen

Next irow

Get next row dot in the column

Next icol

Get next image column of dots

Fig. 2

Fig. 3

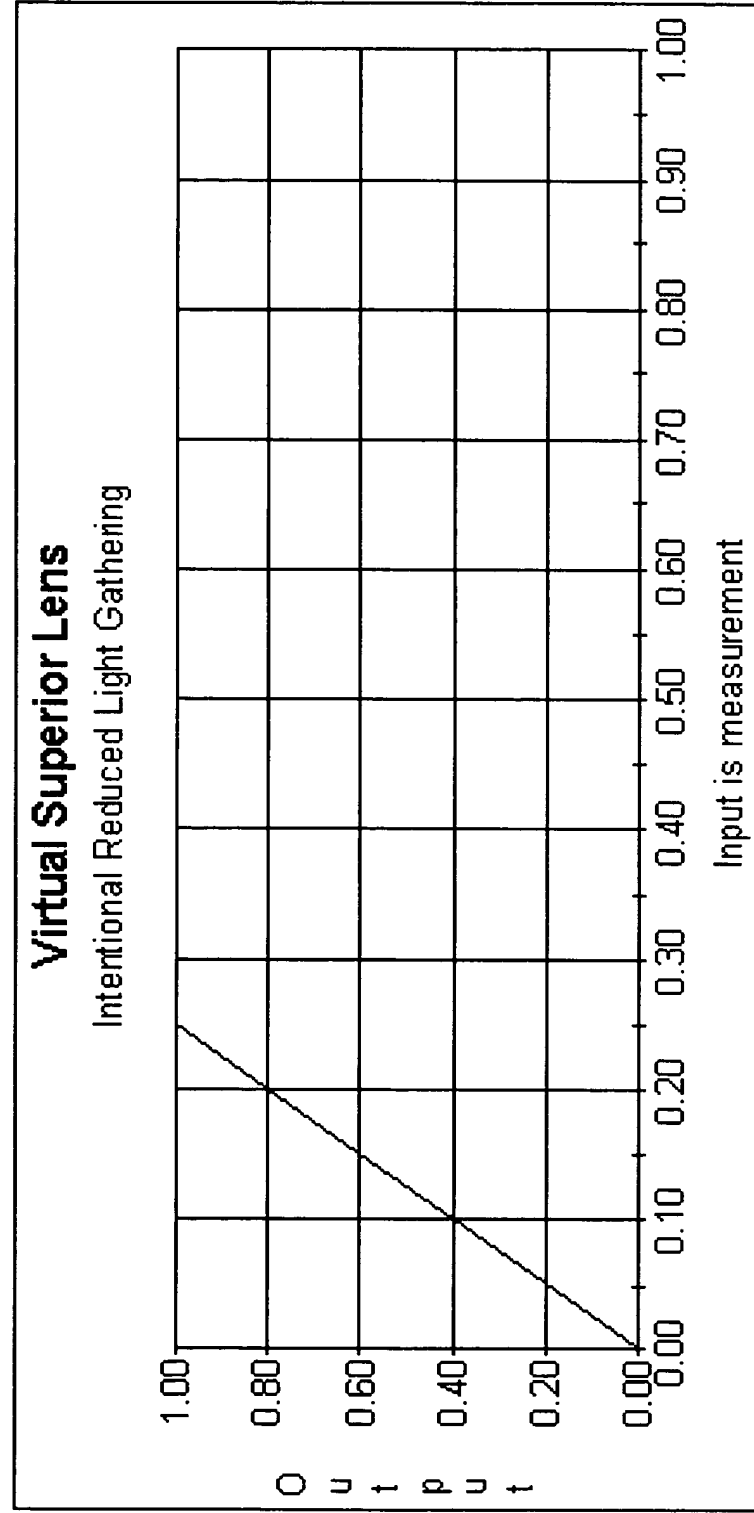


Fig. 4

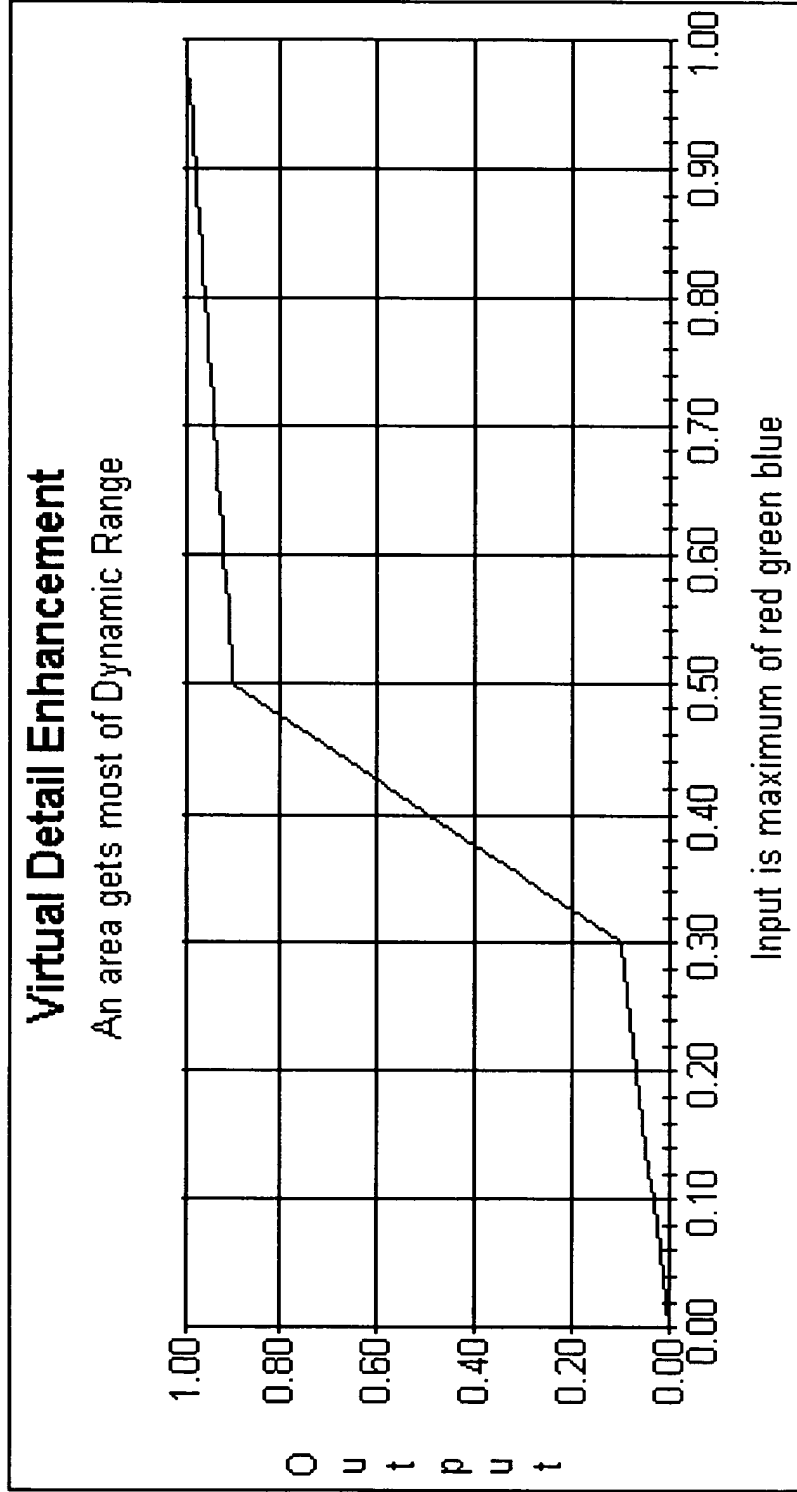


Fig. 5

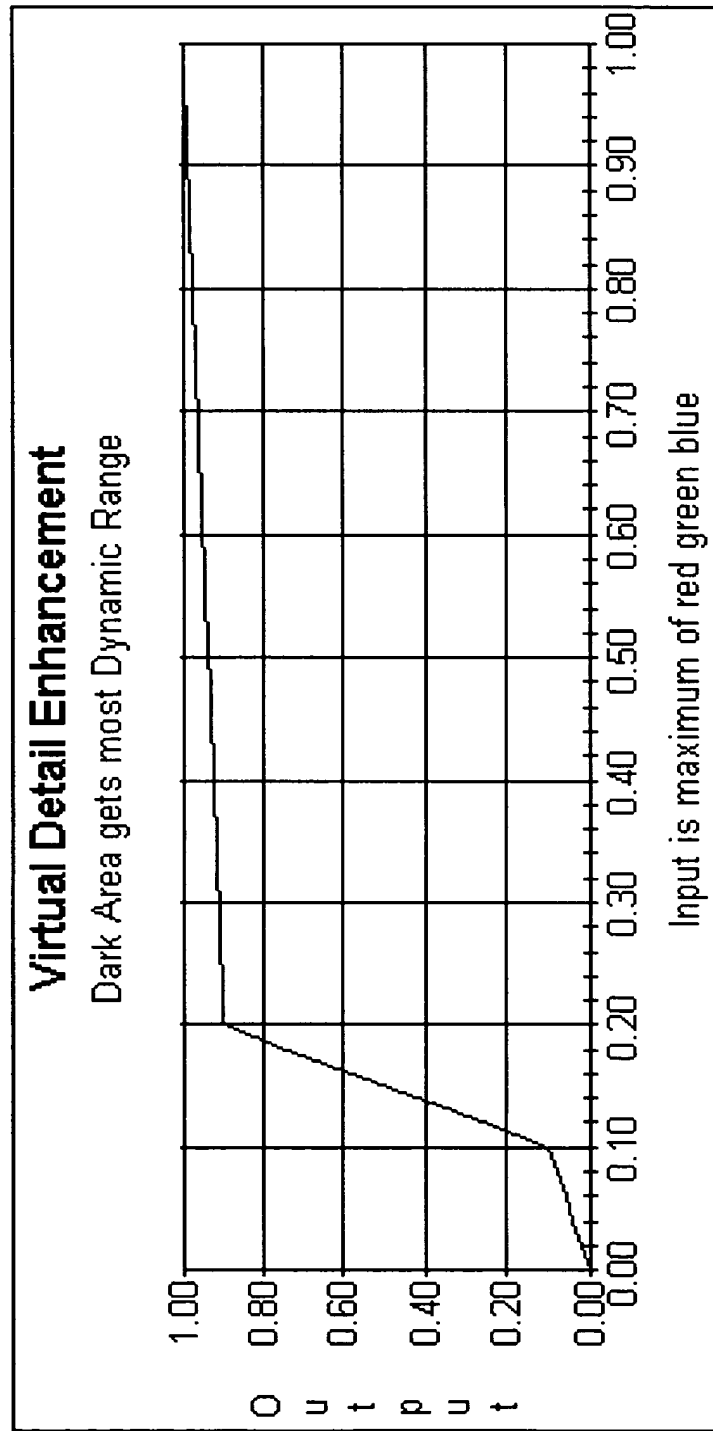
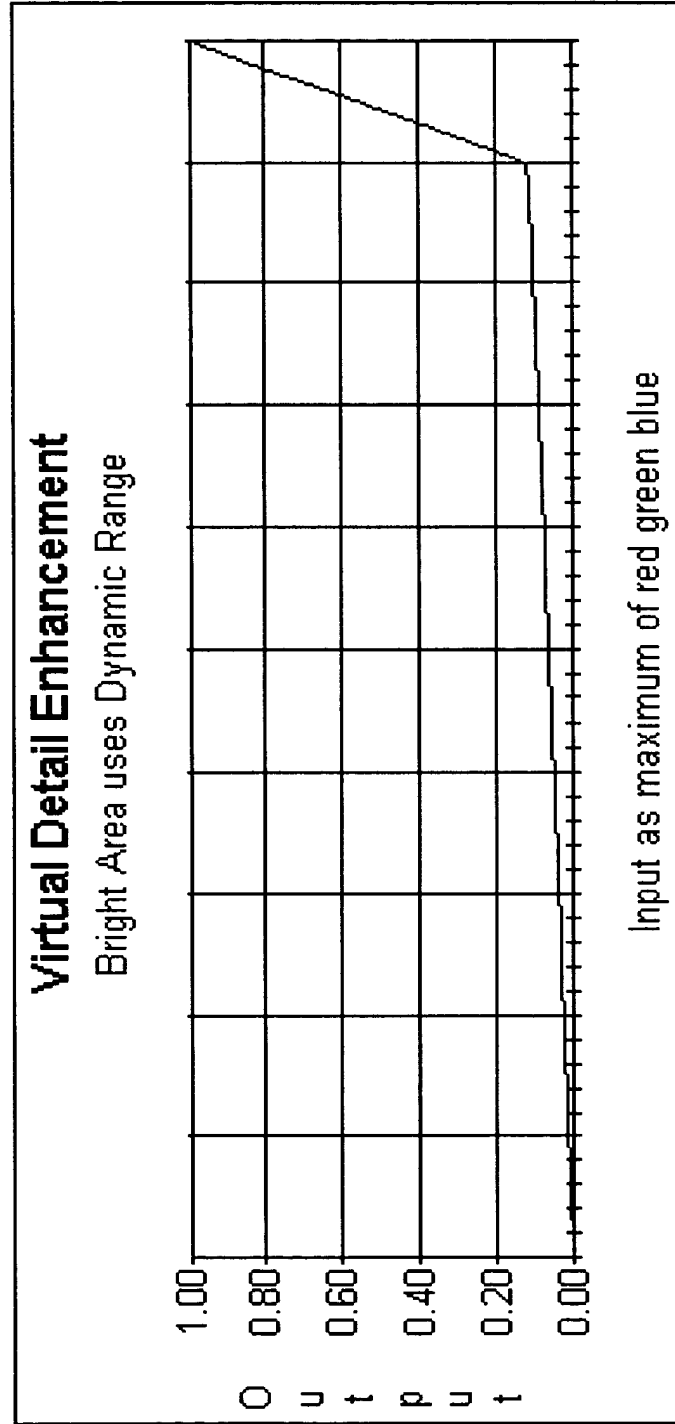


Fig. 6



7/22

Assuming the area was selected so that xdown is less than xup

x1 = xdown +1

x2 = xup -1

y1 = ydown +1

y2 = yup -1

This Statement Ends the loop limit determination

For icol = x1 To x2

For irow = y1 to y2

The next 5 lines determine the color values (RGB)

color = pbox.Point(icol,irow)

blue = color / 65536

color = color mod 65536

green = color / 256

red = color mod 256

Find the dot Maximum

strength = red

If strength < green Then strength = green

If strength < blue Then strength = blue

The next line builds the histogram

hist(strength) = hist(strength) + 1

hist is an array (look up table) that stores the histogram counts

Next irow

Next icol

Find the minimum and maximum strengths, in some statistical sense, recorded stored in the histogram look up table (the array hist()). Creating a second look up table with the running totals of the histogram:

hsum(0) = hist(0)

hsum is the look up table used to hold the running total of the histogram

first (zeroth) running total is the first (zeroth) histogram element

For indx = 1 To drmx

indx is an index that runs from 1 (not 0) to the dynamic range maximum

hsum(indx) = hsum(indx - 1) + hist(indx)

the running total is calculated as previous running total plus next value

Next indx

Fig. 7a

8/22

Code for histogram look-up table

hsum(0) = hist(0)

hsum is the look up table used to hold the running total of the histogram

first (zeroth) running total is the first (zeroth) histogram element

For indx = 1 To drmx

Indx is an index that runs from 1 (not 0) to the dynamic range maximum

hsum(indx) = hsum(indx - 1) + hist(indx)

the running total is calculated as previous running total plus next value

Next indx

p002 = 0.02 * hsum(drmx) wherein

result is 2% of the total count and hsum(drmx) is the last running total (the total) of the histogram counts

p098 = 0.98 * hsum(drmx)

result is 98% of the total count, The next step is to find the index values corresponding to the 2% and 98% occurrence in the histogram.

i002 = -1; i098 = -1

these variables will hold the indices at the 2% and 98% level, for now they are set to -1

For indx = 0 to drmx

the loop runs over all the strength values

if hsum(indx) < p002 then i002 = indx

when the running total is less than 2% total then store it (stop storing it when it is over 2%)

if hsum(indx) < p098 then i098 = indx

when the running total is less than 98% total then store it (stop storing it when it is over 98%)

Next indx

Now, the histogram minimum and maximum values are set with a check to ensure that they are reasonable.

hmin = i002 + 1

hmin is set to 2% level strength index + 1 for reasons of symmetry

If hmin < 1 then hmin = 1

hmin is forced to be no less than 1

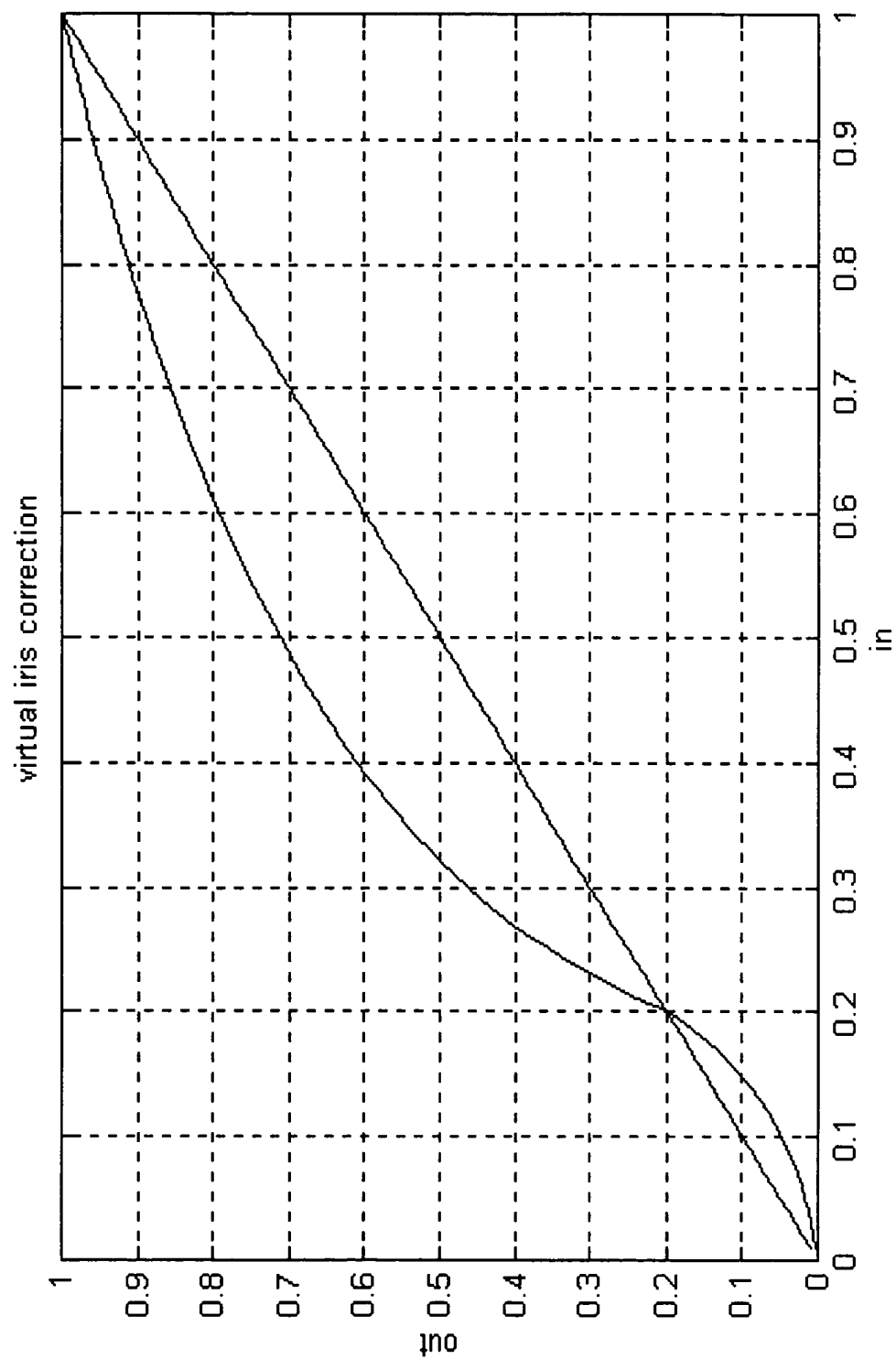
hmax = i098

hmax is set to 98% occurrence level of strength index

If hmax > drmx - 1 then hmax = drmx - 1

hmax is forced to be no more than dynamic range limit - 1 (254)

Fig. 7b

Fig. 8

10/22

Fig. 9a

Input Image



Fig. 9b

PRIOR ART

Brightened

Fig. 9c

PRIOR ART

Bright 80%
Contrast

Fig. 9d

PRIOR ART

Bright 80%
Saturation

Fig. 9e

Virtual Flash

Output Image
Full Dyn Range

Fig. 9f

Virtual Flash

Output Image
Apply Fig. 8
curve

11/22

Fig. 10a

Input Image



Fig. 10b

PRIOR ART
Brightened



Fig. 10c

PRIOR ART
Bright 60%
Contrast



Fig. 10d

PRIOR ART
Bright 60%
Saturation 15%



Fig. 10e

Virtual Flash

Output Image
Full Dyn
Range



Fig. 10f

Virtual Flash

Output Image
Apply Fig. 8
curve



12/22

Fig. 11a

Input Image



Fig. 11b

Forensic Flash

Output Image

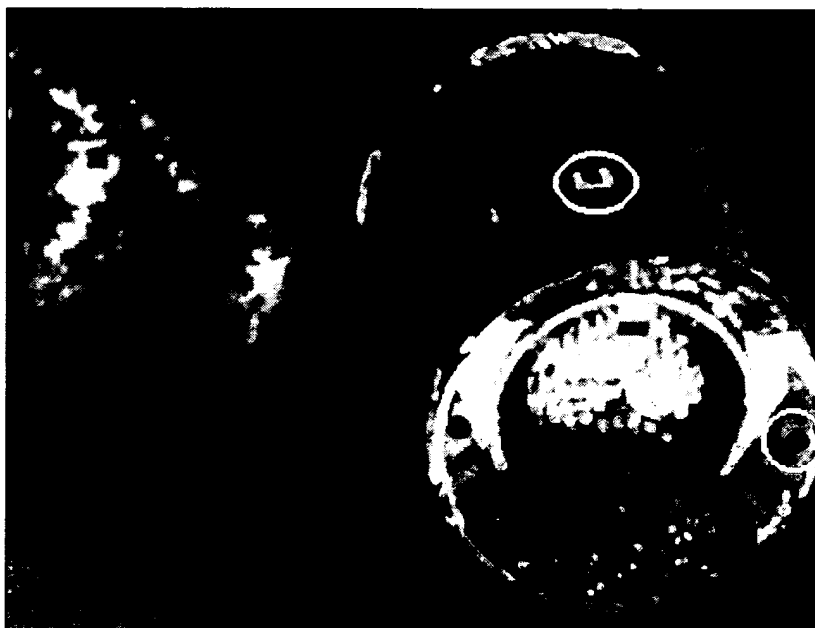


Fig. 12a

Input Image

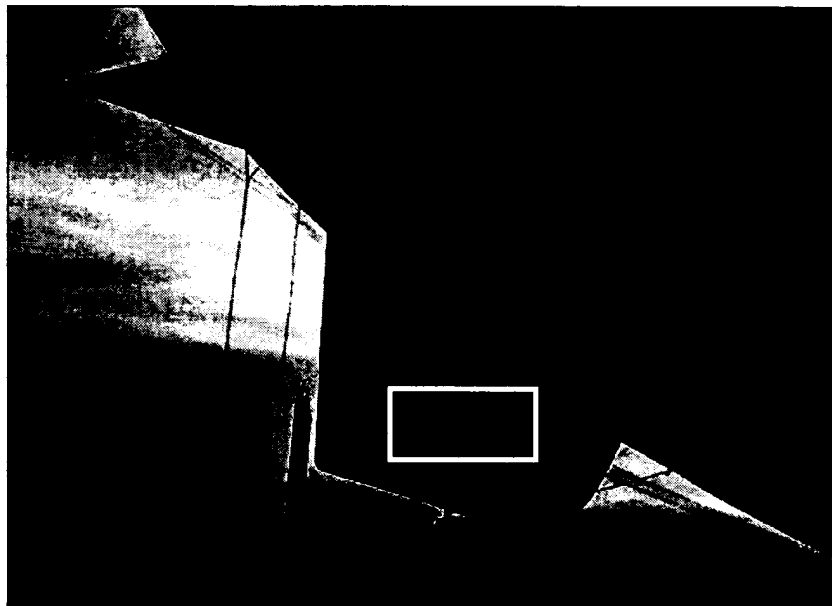


Fig. 12b

Forensic Flash
Output Image

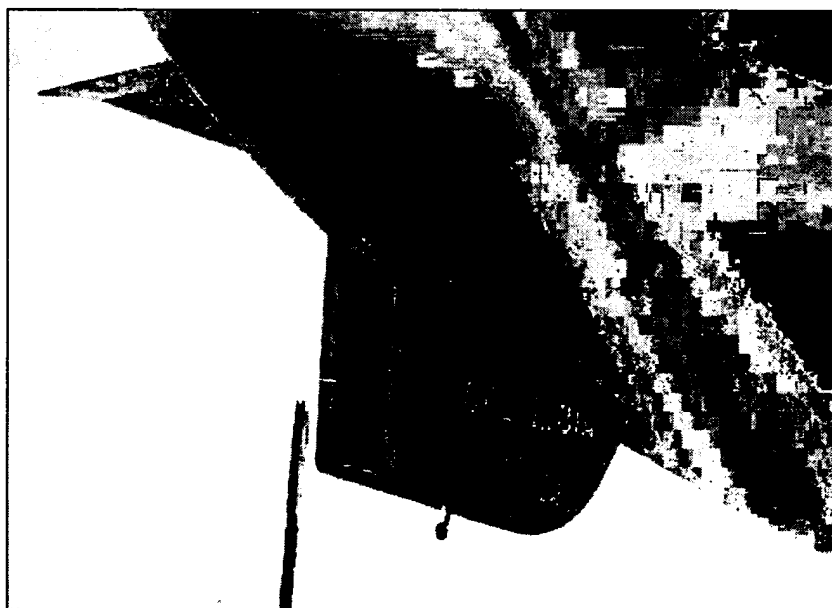


Fig. 13a

Input Image

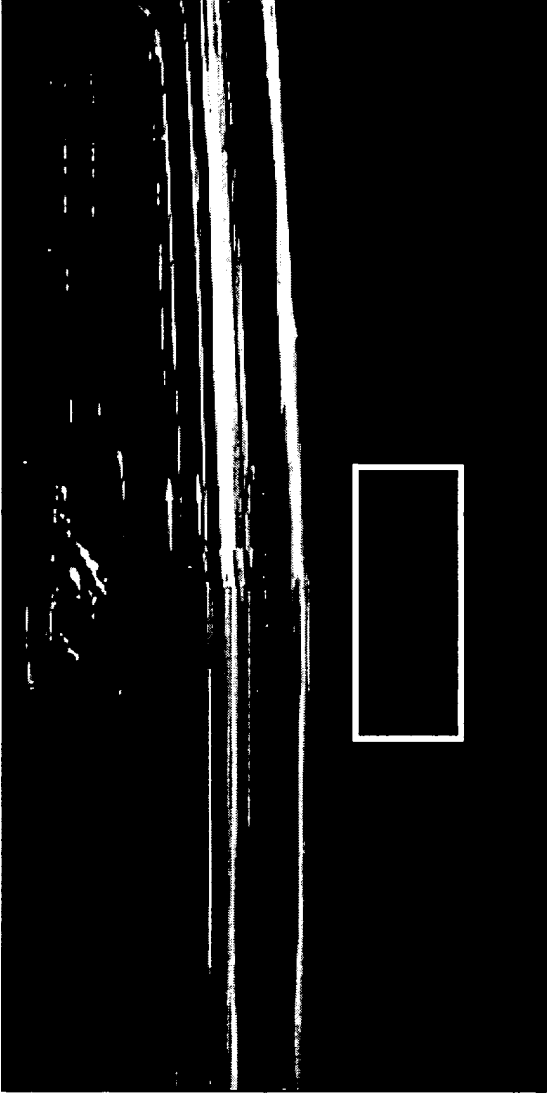


Fig. 13b

Forensic Flash

Output Image

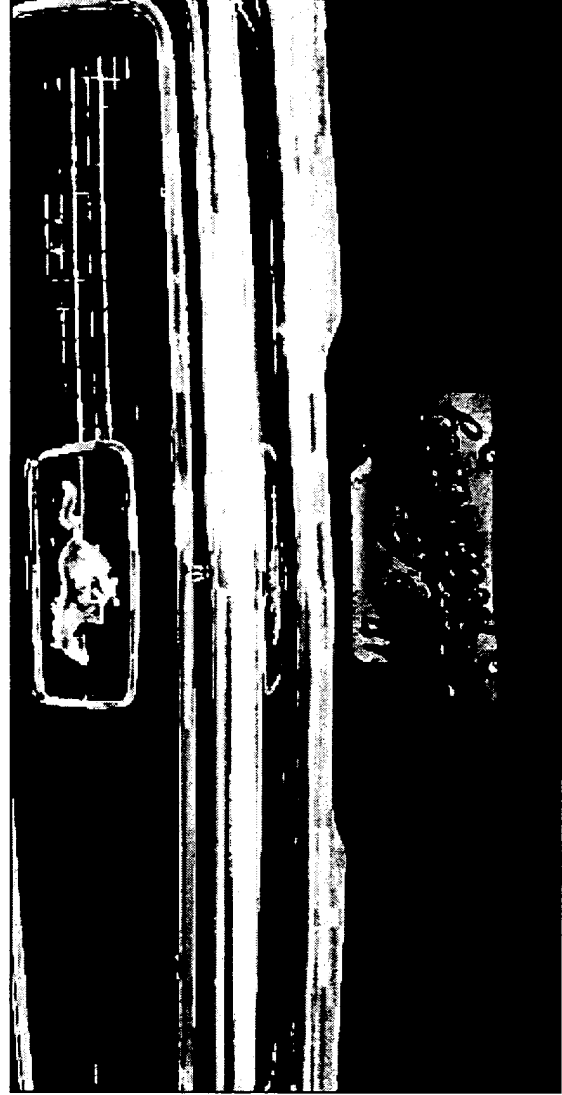


Fig. 14a

Input Image



Fig. 14b

Forensic Flash

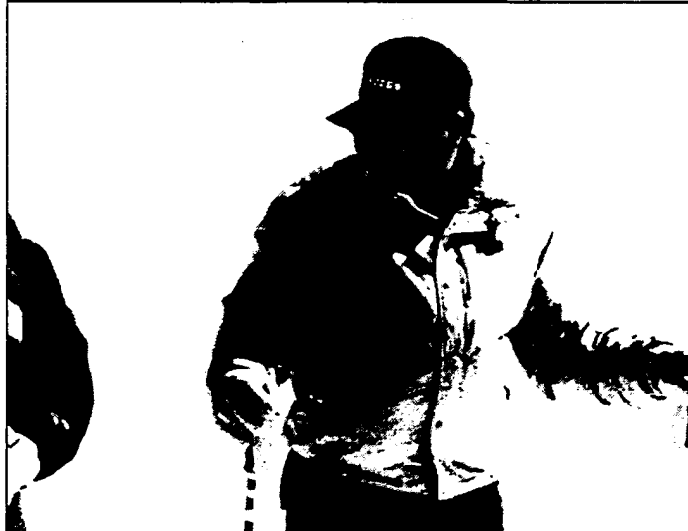
Output Image
Pick Snow



Fig. 14c

Forensic Flash

Output Image
Pick Face



16/22

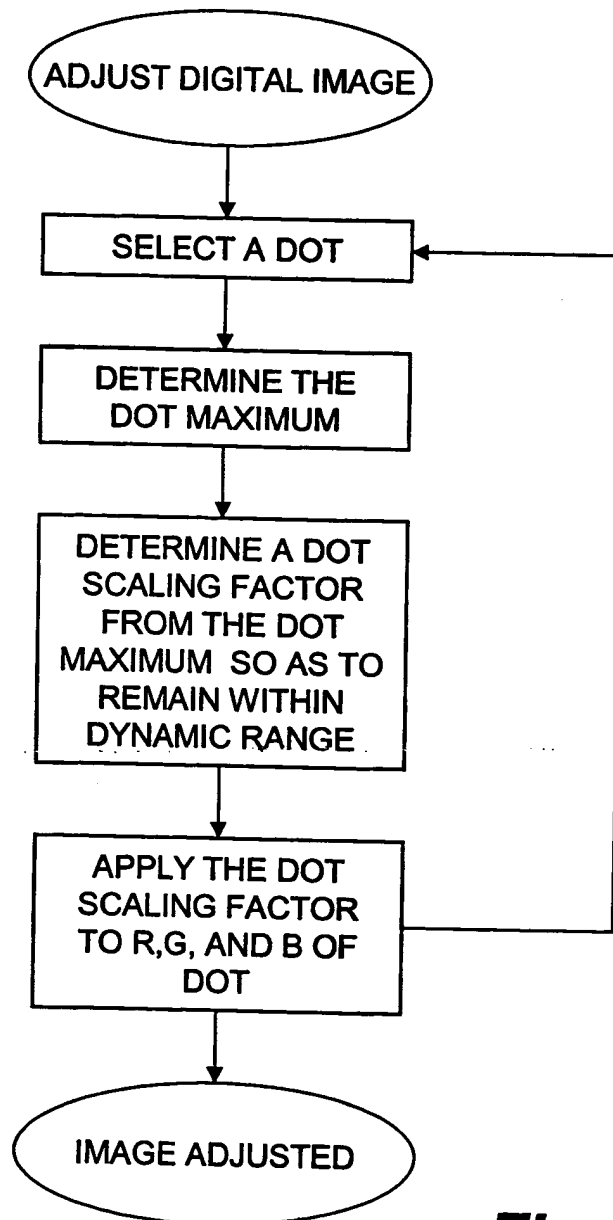
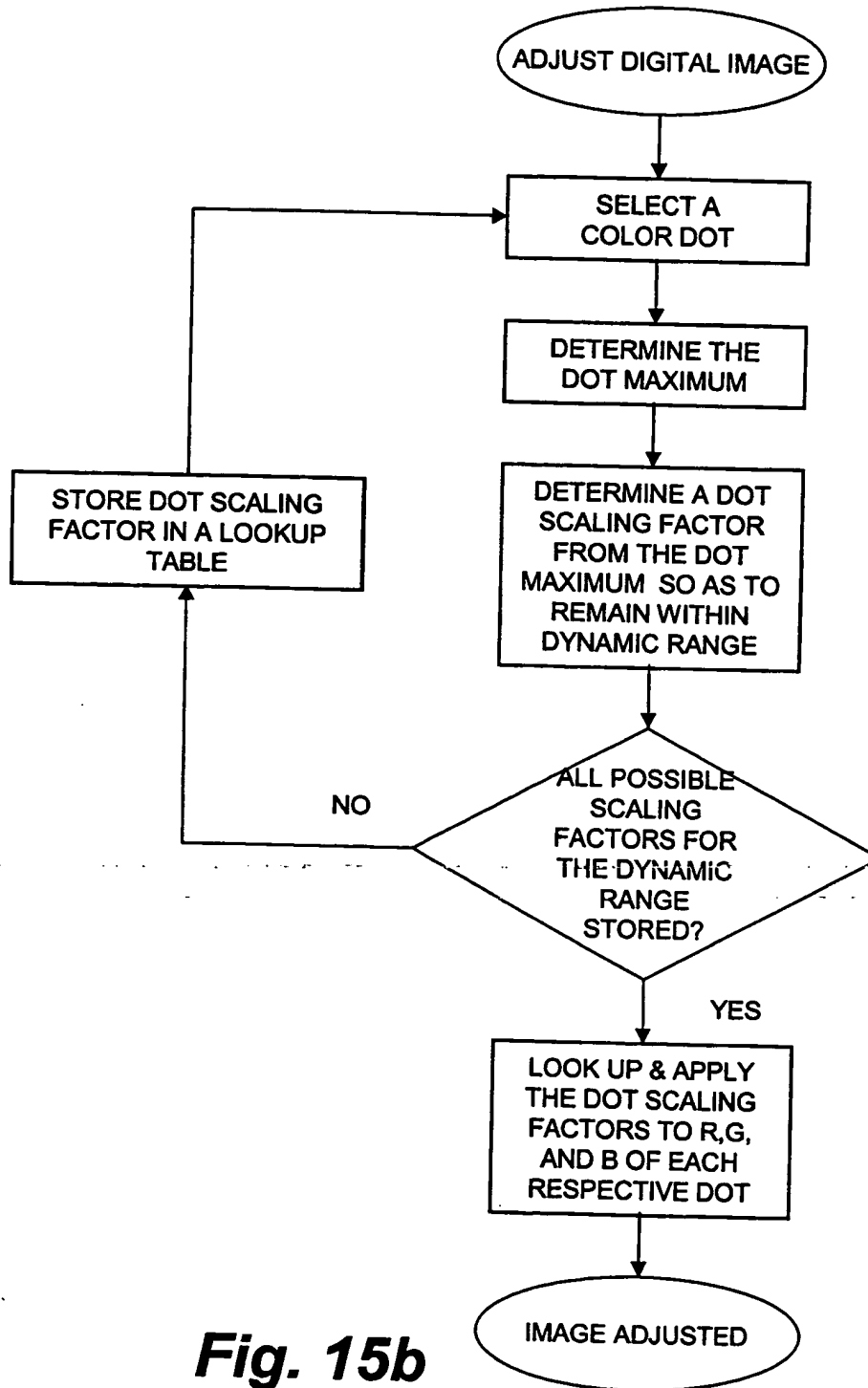


Fig. 15a

**Fig. 15b**

18/22

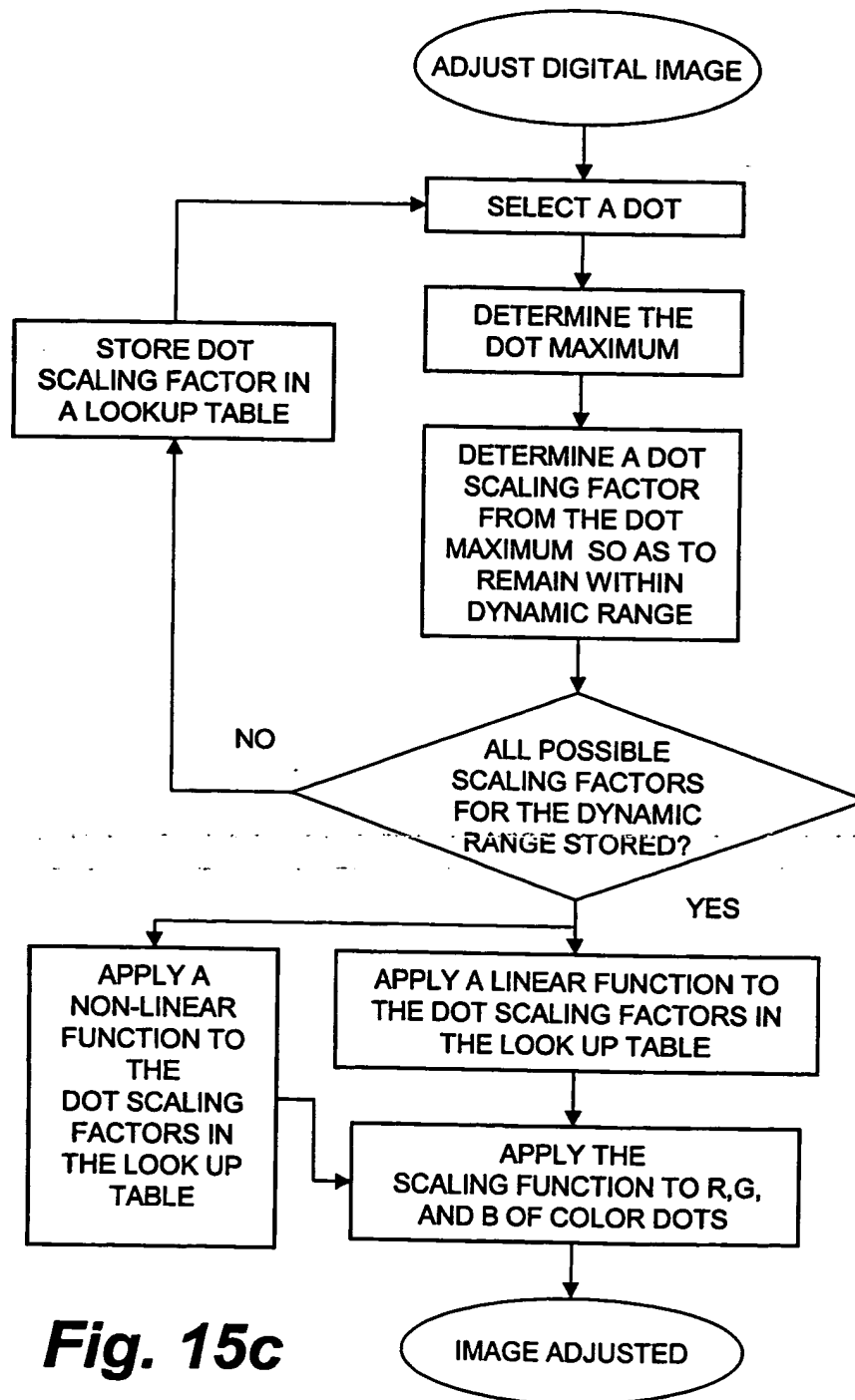


Fig. 15c

19/22

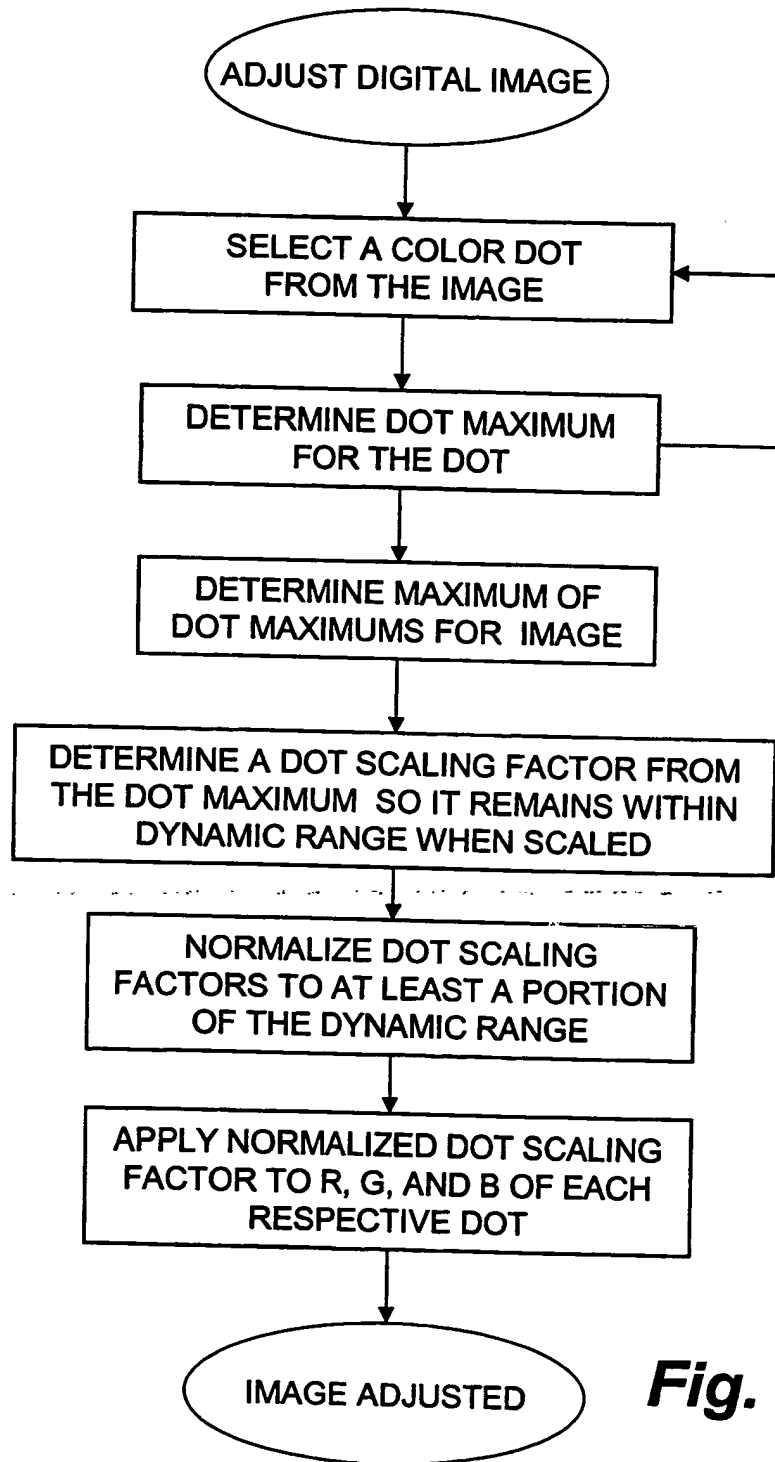


Fig. 16

20/22

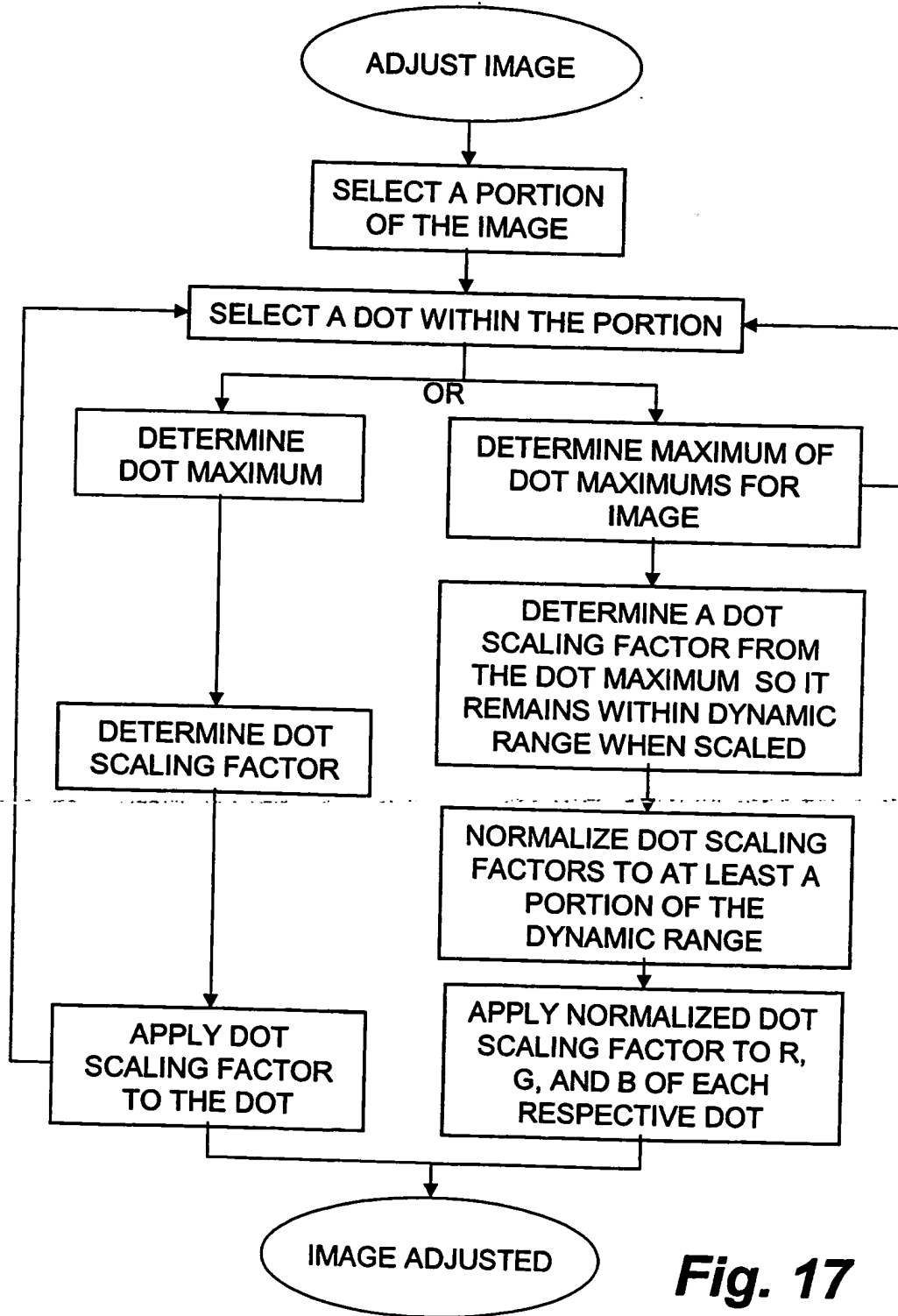


Fig. 17

21/22

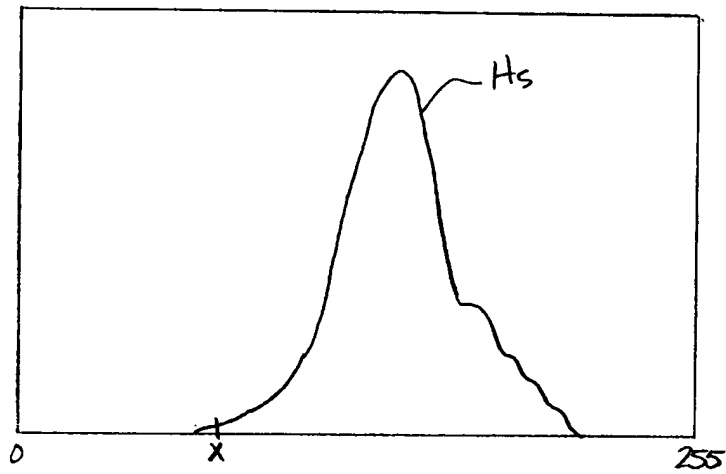


Fig. 18a

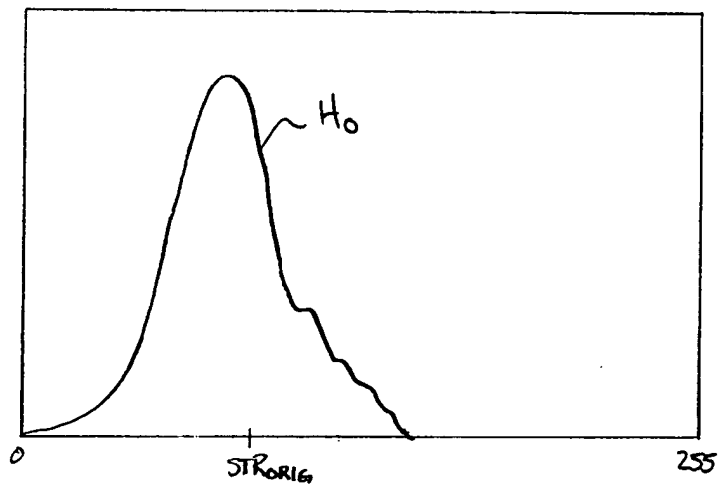


Fig. 18b

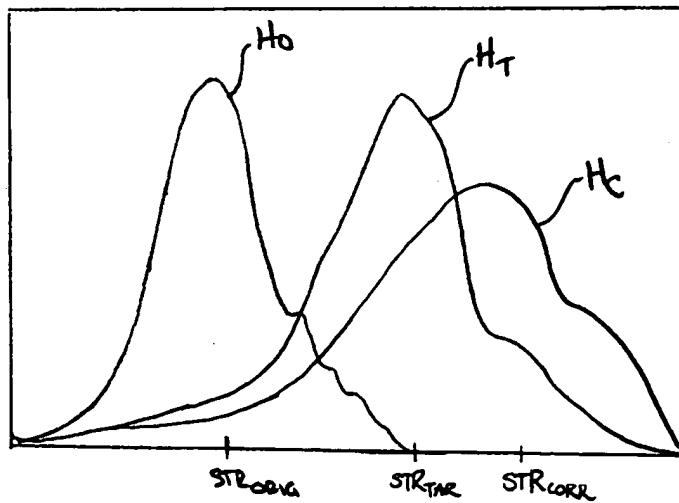


Fig. 20

Fig. 19

